

Notice of Allowability

Application No.

10/054,668

Examiner

Albert W. Paladini

Applicant(s)

YANG ET AL.

Art Unit

2125

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to applicatin filed on 1/22/02.
2. ☒ The allowed claim(s) is/are 1-10.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Reasons for Allowance

1. The following is an examiner's statement of reasons for allowance: None of the references cited or the art searched disclose or teach alone or in combination the finite element modeling method which includes dividing a first face of a hexahedral element into four uniform sections, and dividing a second face diagonally opposite into sixteen uniform sections; dividing a first edge of the hexahedral file into two uniform sections and dividing a second edge diagonally opposite to the first edge into four uniform sections, and performing the further division with respect to the first and second nodes that finally models the hexahedral element into a vertex-refined transition unit mesh module as recited in claims 1 and 5.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Relevant Prior Art

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kocberber (5740342) discloses a method of generating a three dimensional finite-element grid, which is connected to the remaining finite-difference grid. The tetrahedronization is done similarly to the standard advancing front technique. The process, however, is simplified because each region is like a narrow channel, which enables the interior

nodes to be created a priori by a simple process. The interior nodes of both the top and bottom faces of each region are projected half way to the opposite face. A new interior node for the region is created if the node is not within a predetermined distance of the existing faces and nodes. The tetrahedronization is done similarly to the standard advancing front technique. The process, however, is simplified because the interior nodes are defined a priori. After a region is tetrahedronized, the surface triangulation of the region is replaced by the triangles dictated by the surfaces of the tetrahedrons.

Tautges (5768156) discloses a computer based method and apparatus of constructing a hexahedral finite element grid using an all-quadrilateral mesh dual which has the unique property that all portions of the dual can be logically grouped, allowing a higher-level interpretation of the mesh and the global connectivity of its elements. The dual of a quadrilateral or hexahedral mesh has a special structure that allows it to be represented as an arrangement of continuous curves (chords) or surfaces (sheets or whisker sheets).

Sasaki (5819070) discloses a method and apparatus for processing a finite element-meshing model, which includes the extraction of faces and the selection of faces with certain points in a manner that optimizes the analysis with respect to the boundary conditions.

Yang (6573892) discloses a method of constructing surface elements layers for improving the boundary shape of a hexahedral finite element mesh, which includes the steps of constructing a core mesh by superimposing a regular grid on a region to be meshed and removing external elements and external nodes of said region to be meshed; a step of amending said core mesh to have a boundary shape similar to that of said region to be meshed by

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repositioning nodes on the boundary of said core mesh; a step of constructing imaginary thin surface element layers on a boundary surface of said amended core mesh; and a step of performing a mesh smoothing on said imaginary thin surface element layers.

Dhondt (6804635) discloses a method of generating a three-dimensional mesh for a structure for finite element analysis, where after classifying the topologies into simple and complex topologies, the complex ones are reduced to simple ones in sub-steps by cutting in between two opposite element faces. This cutting is performed in two stages: first all elements having edges which are intersected more than once are cut until the number of intersection points is everywhere less than two. Then, the newly generated elements are reclassified and the remaining complex topologies are cut.

Cirak (6876956) discloses a method and system for thin-shell finite element analysis, with the methodology whereby subdivision schemes construct smooth surfaces through a limiting procedure of repeated refinement starting from an initial mesh. This initial mesh will also be referred to as the control mesh of the surface. Generally, subdivision schemes consist of two steps. First the mesh is refined, e.g., all faces are quadrisected, followed by the computation of new nodal positions. These positions are simple, linear functions of the nodal positions of the coarser mesh. The process involves refinement of a coarse triangular mesh to a finer mesh by quadrisect ion.

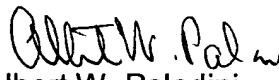
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3. Any inquiry concerning this communication or earlier communication from the examiner should be direct to Albert W. Paladini whose telephone number is (571) 272-3748. The examiner can normally be reached from 7:00 to 3:00 PM on Monday, Tuesday, Thursday, and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Leo P. Picard, can be reached on (571) 272-3749. The official fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

September 7, 2005


Albert W. Paladini
Primary Examiner
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